

**Abstract**

An important feature of communications networks is resilience in the event of failure. Conventional ring-configured networks use 100% bandwidth over provisioning so that

5 in the event of failure of a fibre, a span which may be used to use the spare capacity on the same span and in the event of a total failure in a particular span of both working and protection capacity, it is possible to ring switch the data around the far side of the ring in order to provide total protection. However, 100% over provisioning of bandwidth in the network is expensive. By using up to half the protection bandwidth for working

10 data and using span and ring switching together, it is possible to use some of the bandwidth capacity on the protection path and still retain a robust network configuration.